

Re-accredited by NAAC 'A' Grade University with Potential for Excellence P. G. DEPARTMENT OF MATHEMATICS CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled " **Number Theory and its Application**" submitted by **Reg.No.19S14127 :** <u>Miss Soumya. C. Sungar</u> of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of **M.Sc., in Mathematics,** is a result of M.Sc., project work carried out by her under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad



Dr. (Smt.) Asha. S.K Dr. ASHA. S. K. Asst. Professor Dept. of Mathematics Kamatak University, Dharwad



Date: 02/08/2021

Chairman Prof. H. S. Ramane CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003

2)

Department of Mathematics



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Date: 30-7-2021

CERTIFICATE

This is to certify that the M. Sc. Project work dissertation entitled "GRAPH THEORY" submitted to the Karnataka University, Dharwad by Miss. SOUMYA MUNNOLI as a partial fulfillment for the award of the degree of Master of Science in Mathematics represents her project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. She has carried out this project work at the P.G. Department of Mathematics, Karnataka University, Dharwad under my supervision and Guidance.

Dr.(Sm Departe Karnataka

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Chairma

Department of Mathematics, Karnataka University, Dharwad

CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-590 003

Department Of Mathematics



Re-accredited by NAAC 'A' Grade University with Potential for Excellence

Date:

CERTIFICATE

This is to certify that the M. Sc. project work dissertation entitled "Numerical Methods" submitted to the Karnatak University, Dharwad by Miss. Soumya Patil (19S14129) as a partial fulfilment for the award of the Degree of Master of Science

in Mathematics represents her project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. She has carried out this project work at the P. G. Department of Mathematics, Karnatak University, Dharwad, under my supervision and guidance.

Dr. (8) Dharwad

Chairman CHAIRMAN Depertment of Matheminics Kattarar Uliversity Dharwad DHARWAD-580 CC2

Examiners: 108/2021 1. 2.

Department of Mathematics



Re-accredited by NAAC 'A' Grade University with Potential for Excellence

CERTIFICATE

Examination Reg.No.:

Date:

This is to certify that the M.Sc. project work dissertion called "LINEAR ALGEBRA THROUGH MATRICES" Submitted to the Karnatak University, Dharwad by Miss. Sushma Hegde as a partial fulfillment for the award of the Degree of Master of Science in Mathematics represents her project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other university or Institution. She has carried outthis project work at the P.G.Department of Mathematics, Karnatak University, Dharwad under my supervision and guidance.

Dr.(Smt) Asha .S.K. DProjec Suide S. K. Department of Malhematics Karnatak university, Oharwad.

2021

Examiners

Department of Mathematics

Karnatak University, Dharwad. CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003

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KARNATAK UNIVERSITY, DHARWAD Department of Mathematics



Re-Accrediated by NAAC 'A' Grade University with Potential for Excellence

Date:

CERTIFICATE

This is to certify that the M.Sc. project work Dissertation entitled "BESSEL'S DIFFERENTIAL EQUATION" submitted to the Karnatak University, Dharwad by Miss. Swati .B.Demagondanvar as a partial for the fulfilment for the award of this or any other degree or diploma of this or any other University or Institution. She has carried out this project work at the P.G. Department of Mathematics, Karnatak University, Dharwad under my supervision and guidance.

KD Dr.(Smt. DA ProjectsGufftofessor Dept. of Mathematics Department of Mathe

Karnatak University, Dharwad

Examiners:

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Chairman

CHAIRMAN Department of Mathematics Alfantak University, Karnatak University, Dharwad

KARNATAK UNIVERSITY, DHARWAD Department of Mathematics



Re-Accredited by NAAC 'A' Grade University with Potential for Excellence

Date: 30 07 2021



This is to certify that the M.Sc. project work dissertation entitled "GOLDEN RATIO" submitted to the Karnatak University, Dharwad by Miss. Swati Joshi as a partial fulfillment for the award of the Degree of Master of Science in Mathematics represents her project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. She has carried out this project work at the P.G. Department of Mathematics, Karnatak University, Dharwad, under my supervision and guidance,

Dr. (Smt.) Asha 20

Project Guide Departmention Alathematics Karnatek Liniversity, Dharwad Dept. of Mathematics Karnatek University, Dharwad

Examiners:

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Chairman AN Department of Mathematics Department of Mathematics Karnatak University, Dharwad

Department of Mathematics



Re-accredited by NAAC 'A' Grade University with Potential for Excellence

Date: 30-7-2021

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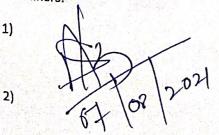
This is to certify that the M. Sc. Project work dissertation entitled "GRAPH THEORY" submitted to the Karnataka University, Dharwad by Miss, THRIVENI.Y.N. as a partial fulfillment for the award of the degree of Master of Science in Mathematics represents her project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. She has carried out this project work at the P.G. Department of Mathematics, Karnataka University, Dharwad under my supervision and Guidance.

Dr.(Smt

Project File Department of Mathematics Karnataka University, Dharwady, Dharwad Karnatak

Department of Mathematics, Karnataka University, Dharwad CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003

Examiners:



KARNATAK UNIVERSITY, DHARWAD Department of Mathematics



Re-accredited by NAAC 'A' Grade University with Potential for Excellence

Date: 30 - 7-2021

CERTIFICATE

This is to certify that the M.Sc project work dissertation entitled "NUMERICAL OPTIMIZATION" submitted to Department of Mathematics, Karnatak University, Dharwad by Mr. Tilak Krishna Moger and Mr. Vijayraj S. Kamble as a partial fulfillment for the award of degree of Master of science in mathematics and it has not been submitted previously, for the award of any degree or diploma of this or any other University or Institution. They have carried out this project work at the department of studies and research in Mathematics, Karnatak University, Dharwad under my supervision and guidance.

Dr. (Smt.) A Department of Mathematicsad Karnatak University, Dharwad

Examiners:

08/2021 1. 2

Dr. H. S. Ramane Chairman Department of Mathematics Karnatak University, Dharwad CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003



Re-accredited by NAAC 'A' Grade University with Potential for Excellence

P. G. DEPARTMENT OF MATHEMATICS CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled "LAPLACE TRANSFORMS AND ITS APPLICATIONS" submitted by Reg.No.19S14135: Miss.Ujama.N.Patil of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc., in Mathematics, is a result of M.Sc., project work carried out by her under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad

Project G

Prof. Asha.S.K

Dr. ASHA. S. K. Asst. Professor Dept. of Mathematics Kamatak University, Dharwad

Examiners:-

2021

Date: 2-8-2021

Chairman

Prof. H. S. Ramane CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003



Dr. (Smt). Asha.S.K. Professor Department of Mathematics

Pavate Nagar, Dharwad-580 003 Karnataka, India Phone: 0836-221522(O)

Date: 2-8-2021

CERTIFICATE

This is to certify that the M. Sc. project work dissertation entitled "Linear Algebra" submitted to the Karnatak University, Dharwad by Miss. Vidyashri S Gouda (19S14136) as a partial fulfilment for the award of Degree of Master of Science in Mathematics represents their project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. They have carried out this project work at the P. G. Department of Mathematics, Karnatak University, Dharwad, under my supervision and guidance.

Dr.(Smt) Project Guide athematics Department of Hewady Dharwad Karnatak Unive

Examiners:

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Chairman Department of Mathematics Karnatak University, Dharwad CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003

Department of Mathematics



Re-accredited by NAAC "A" Grade University with Potential for Excellence

Date: 3-8-2021

CERTIFICATE

This is to certify that the M. Sc. Project work dissertation entitled "FOURIER ANALYSIS AND IT'S APPLICATIONS" submitted to the Karnatak University, Dharwad By Miss. YasminSaiyad as a partial fulfillment for the award of the Degree of Master of Science in Mathematics represents her project work and it has not been previously, for the award of any degree or diploma or any other University or Institution. She has carried out this project work at the P.G. Department of Mathematics, Karnatak University, Dharwad Under my supervision and guidance.

Dr.(Smt Project guidasst. Professor Dept of Mathematics Department of Mathematicstv. Dharwad

Karnatakuniversity, Dharwad

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-Chairman

Department of Mathematics

Karnatak University, Dharwad CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003



Re-accredited by NAAC 'A' Grade University with Potential for Excellence P. G. DEPARTMENT OF MATHEMATICS CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled "PI: GEOMETRIC ASTONISHMENT" submitted by Reg.No.19S14059: Miss. Aishwarya.V.Yaligar and Reg.No.19S14058: Miss.Aishwarya of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc., in Mathematics, is a result of M.Sc., project work carried out by them under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad

31.7.2)

Project Guide Prof. B. Basavanagoud

Date: 31. 7.21

Chairman Prof. H. S. Ramane CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003

Examiners:-

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Dr.H.S.Ramanc Chairman Department of Mathematics Pavate Nagar, Dharwad-580 003 Karnataka, India Phone: 0836-221522(O)

Date: 30-07-2021

CERTIFICATE

This is to certify that the M. Sc. project work dissertation entitled "e : The Scientific Base" submitted to the Karnatak University, Dharwad by Miss. Akshata R. Meti (19S14060) as a partial fulfilment for the award of Degree of Master of Science in Mathematics represents their project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. They have carried out this project work at the P. G. Department of Mathematics, Karnatak University, Dharwad, under my supervision and guidance.

Basavanagour Dr. B. Basavanagoud

Project Guide Department of Mathematics Karnatak University, Dharwad

Examiners:

Chairman

Department of Mathematics Karnatak University, Dharwad CHAIRMAN Department of Mathematics Karnatak University, DMARWAD-580 003

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Dr.H.S.Ramane Chairman Department of Mathematics Pavate Nagar, Dharwad-580 003 Karnataka, India Phone: 0836-221522(O)

Date: 30 07 2021

CERTIFICATE

This is to certify that the M. Sc. project work dissertation entitled "e : The Scientific Base" submitted to the Karnatak University, Dharwad by Miss. Ankita S. Kotyal (19S14061) as a partial fulfilment for the award of Degree of Master of Science in Mathematics represents their project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. They have carried out this project work at the P. G. Department of Mathematics, Karnatak University, Dharwad, under my supervision and guidance.

B. Basavanagorie 20.7.21

Dr. B. Basavanagoud **Project Guide** Department of Mathematics Karnatak University, Dharwad

Chairman Department of Mathematics Karnatak University, Dharwad CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-590 003

Examiners:

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DEPARTMENT OF MATHEMATICS

CERTIFICATE

This is to certify that Ms.ARALI NIKITA SHIVALINGAPPA and ARPITHA K .P, IV semester, M.Sc(Mathematics) has worked on the project entitled "i:IMAGINARY, BUT CAN'T IGNORE IT" under my supervision and guidance.

Place: Dharwad Date: 30/07/2021

B. Busavanagon

(Dr. B. BASAVANAGOUD) Professor Department of Mathematics Karnatak University Dharwad-580 003

CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003



DEPARTMENT OF MATHEMATICS

CERTIFICATE This is to certify that Ms. ATIKA KARIGAR, IV semester, M.Sc (Mathematics) has worked on the project entitled "EULER'S IDENTITY" under my supervision and guidance.

Place : Dhawad Date : 31 |07 | 2021

B. Basavanagond

(Dr. B. BASAVANAGOUD) Professor Department of Mathematics Karnatak University Dharwad-580 003

CHAIRMAN Department of Mathematics Karnotak University, D' AD-580 003



DEPARTMENT OF MATHEMATICS

CERTIFICATE

This is to certify that Ms.CHAITRA KAMALAKAR SHET, IV semester, M.Sc (Mathematics) has worked on the project entitled "SYSTEM OF NON-LINEAR DIFFERENTIAL EQUATIONS" under my supervision and guidance.

Place: Dharwad

Date : 30-07-2021

Department of Mathematics Karnatak University, DHARWAD-580 003

B. Basavanaguud 30.7.21

(Dr. B. BASAVANAGOUD) Professor Department of Mathematics Karnatak University Dharwad-580 003



DEPARTMENT OF MATHEMATICS

CERTIFICATE

This is to certify that Ms.DARSHANA GOWDA, IV semester, M.Sc (Mathematics) has worked on the project entitled "NUMERICAL METHODS" under my supervision and guidance.

Place: Dharwad Date: 30-07-2021

B. Basavanagour 30-7-21

(Dr. B. BASAVANAGOUD) Professor Department of Mathematics Karnatak University Dharwad-580 003

CHAIRMAN Department of Mathematics Karnatak University,



DEPARTMENT OF MATHEMATICS

CERTIFICATE

This is to certify that Ms.DEEPA MADIVALAR, IV semester, M.Sc (Mathematics) has worked on the project entitled "EULER'S FORMULA AND ITS APPLICATION" under my supervision and guidance.

Place: Dharwad Date: 30-07-2021

B. Basavanagouc

(Dr. B. BASAVANAGOUD) Professor Department of Mathematics Karnatak University Dharwad-580 003

Department of Mathematics Karnatak University, DHARWAD-580 003



DEPARTMENT OF MATHEMATICS

CERTIFICATE

This is to certify that Mr. GANESH PUJAR IV semester, M.Sc (Mathematics) has worked on the project entitled "VECTOR SPACE

"under my supervision and guidance.

Rey No:- 19514069

 Place:
 DHRWAD

 Date:
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R. Rasavanagour

(Dr. B. BASAVANAGOUD) Professor Department of Mathematics Karnatak University Dharwad-580 003

Department of Mathematics Karnatak University Dharwad-580 003.



Dr.H.S.Ramane Chairman Department of Mathematics Pavate Nagar, Dharwad-580 003 Karnataka, India Phone: 0836-221522(O)

Date: 30 07 2021

CERTIFICATE

This is to certify that the M. Sc. project work dissertation entitled "Ordinary Differential equation" submitted to the Karnatak University, Dharwad by Miss. Lavanya Shivappa Kadadi (19S14081) as a partial fulfilment for the award of Degree of Master of Science in Mathematics represents their project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. They have carried out this project work at the P. G. Department of Mathematics, Karnatak University, Dharwad, under my supervision and guidance.

H. S. Ramane AMANE

Departmentrof Mathematics Ramarament of Mathematics Ramarament of Mathematika Ramarak University, Dharwad - 580003. India

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Department of Mathematics Karnatak University, Dharwad Department of Mathematics Karnatak University, DHARWAD-580 003



<u>CERTIFICATE</u>

This is to certify that, the M.Sc project work dissertation entitled "FIBONACCI SEQUENCE & IT'S APPLICATIONS" submitted to the Karnatak University, Dharwad by Mr. MANJUNATH H. TALAWAR and Mr. NAVEENA F. MANASHETTY as partial fulfilment for the award of the degree of Master of Science in Mathematics and it has not been submitted previously, for the award of any other degree or diploma of this or any other university or institution. They have carried out this project work at the department of Mathematics, Karnatak University, Dharwad, under my supervision and guidance.

Place: Dharwad

Date:

Project Guide Dr. H. S. RAMANE

Dr. Hrefessora MANE Department of Mathematics Karnatak University, Dharwad - 580003, India

Examiners:

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Chairman DepartnoenAoRMathematics, Rapanakentiversity, Dhatwad Karnatak University, BHARWAD-580 003



KARNATAKA UNIVERSITY

DHARWAD

Dr.H S Ramane Dharwad-580003 Chairman Department of Mathematics

Karnataka, India Phone: 0836-221522(O)

CERTIFICATE

This is to certify that the M.Sc. project work dissertation entitled "Elliptical Differential Equation" submitted to the Karnataka University, Dharwad by Miss. Laxmi M Hattimani (Reg.No:19S14082) as a partial fulfilment for the award of the Degree of Master of Science in Mathematicsrepresents his project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. She has carried out this project work at the P. G. Department of Mathematics, Karnataka University, Dharwad, under my supervision and guidance.

amane 01 M.Sc., Ph.D., PGDIM

Project Guideofessor Department of Mathematics Karnataka aniversity: Dharwad Dharwad 580003 India

Examiners:

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Chairman

Department of Mathematics Karnataka University, Dharwad CHAIRMAN Department of Mathematics Karnatak University, DRACTEAD-580 003



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P. G. DEPARTMENT OF MATHEMATICS

CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled"GRAPH THEORY AND ITS APPICATIONS" submitted by us Miss. M. SREELEKHA (Reg.No.19514083) AND Miss. MEGHA.S.MUGANUR (Reg.No.19S14088) of fourth concentrations in Mathematics course to the Karnataka University, Dharwad for a ward of the degree of M.Sc. in Mathematics, is a result of M.Sc., project work carried out by them under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad Date: 2-8-2821

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Project Guide Prof.H.S.Ramanc, VAMANE M.Sc., Ph.D., PGDIM Professor **Gepariment of Mathematics** Examiners:-Kamatak University,

Dharwad 559003 India

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1)

Chairman

Prof. H.S.Ramane CHAIRMAN Department of Mathematik Karnatak University, DHARWAD-580 003



Re-accredited by NAAC 'A' Grade University with Potential for Excellence P. G. DEPARTMENT OF MATHEMATICS CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled "Numerical Analysis" submitted by Reg.No.19S14086: Miss.Manasa Naik and Reg.No.19S14089 Miss. Mehreen Hansi of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc., in Mathematics, is a result of M.Sc., project work carried out by her under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad

Date: 31 07/2021

Project Guide & Chairman Prof NPSA Ramane Department of Mathematics Karnatak University, DHARWAD-580 003

Examiners:-

2)



CERTIFICATE

This is to certify that, the M.Sc project work dissertation entitled "CANONICAL FORMS OF MATRICES" submitted to the Karnatak University, Dharwad by Mr. MAHESHAGOUDA and Mr. MALLAPPA MELLIKERI as partial fulfilment for the award of the degree of Master of Science in Mathematics and it has not been submitted previously, for the award of any other degree or diploma of this or any other university or institution. They have carried out this project work at the department of Mathematics, Karnatak University, Dharwad, under my supervision and guidance.

Place: Dharwad

Date: 30-7-2021

Project Guide

Dr. H. S. RAMANE DI. H.S. RAMANE Professor.sc., Ph.D., PGDIM Professor Department of Manufamenics Kamatak University, Difarwad Dharwad - 550003, India

Chairman

Departicine of Mathematics, Acamater Ohio Ersity, Difference of the State Karnatak University, DHARWAD-580 003

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"University with Potential for Excellence" Accredited by NAAC with 'A' Grade



DEPARTMENT OF MATHEMATICS

Certificate

This is to certify that the dissertation entitled "Group Actions And Applications" submitted to the Department of Mathematics, Karnatak University, Dharwad, is satisfactorily completed by Miss Namrata Prasad Phadke for the partial fulfillment of the requirement for the award of the Degree of Master of Science in Mathematics during the academic year 2020-2021.

Hartufi Dr. H. S. Ramane

Project Guide and The Chairman Department of Mathematics Karnatak

> CharmatiAN Department of Mathematics Karnatak University, DHARWAD-590 003 Examiners:

2.

Place: Dharwad

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Date: 30-07-2021

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Dr. P G. Path Professor Department of Mathematics

Pavate Nagar, Dharwad-580 003 Kamataka, India Phone: 0836-221522(O)

Date: 30.07.202)

CERTIFICATE

This is to certify that the M. Sc. project work dissertation entitled "APPLICATIONS OF VECTOR SPACE" submitted to the Karnatak University, Dharwad by Mr. Naveen Shankrappa Sajjan (19814092) and Mr. Praveen Ishwarappa Kerimani (19814101) as a partial fulfiliment for the award of Degree of Master of Science in Mathematics represents their project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. They have carried out this project work at the P. G Department of Mathematics, Karnatak University, Dharwad, under my supervision and guidance.

Project Guide Professor Department of Mathematics Karnatak University Dharway sity

Examiners:

2.

Dr. H S. Rumane Chairman Department of Atathematics Karnatak University, Dilarwart Departmentak University, Dilarwart Marnatak University, Dilarwart



Dr. P. G. Patil Professor Department of Mathematics Pavate Nagar, Dharwad-580 003 Karnataka, India Phone: 0836-221522(O)

Date: 31/ \$12021

CERTIFICATE

This is to certify that the M. Sc. project work dissertation entitled "Non-linear partial differential equations" submitted to the Kaonatak University, Oharwad by Miss. Pallavi Salunke (19814097) and Miss. Pooja Randewadi (19814098) as a partial fulfilment for the award of Degree of Master of Science in Mathematics represents their project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. They have carried out this project work at the P. G. Department of Mathematics, Karnatak University, Dharwad, under my supervision and guidance.

Dr. P. G.Pat

Project Guide M.Sc., Fb. D. Department of Mathematics Karnatak University, Dharwad erstry Dharwad-580 003, India.

Examiners:



Dr. P. G. Patil Professor Department of Mathematics

Pavate Nagar, Dharwad-580 003 Karnataka, India Phone: 0836-221522(O)

Unic: 20-07 2021

CERTIFICATE

This is to certify that the M.So project work dissertation entitled "TOPOLOGICAL VECTOR SPACES" submitted to the Karnatak University. Dharwad by Miss. P ANUSHA (19814094) Miss. PALLAVI IRA HALLER (19814096) and Miss. POORNIMA BASAVARAJ KARHIOLI (19814099) as a partial fulfilment for the award of Degree of Muster of Science in Mathematics represents their project work and it has not been submitted proviously, for the award of any other degree or diploma of this or any other University or Institution. They have carried out this project work at the P. G. Department of Valliematics, Kannatak University, Dharwad, under my supervision and guidance.

Project Guide G. PATIL Department of Mathématics Dinapatheent of Mathematics KarnatakikakanaiWersity wad Dharwad-580 003, India.

Examiners:

Department of Mathematics Kamatainem of Mathematics Difference University, DHARWAD-580 003



Dr. P. G. Patil Professor Department of Mathematics

Pavate Nagar, Dharwad-580 003 Karnataka, India Phone: 0836-221522(O)

Date: 36/7/24

CERTIFICATE

This is to certify that the M. Sc. project work dissertation entitled "-COMPACT SPACES " submitted to the Karnatak University, Dharwad by Miss. Padasalagi Changapur (19514093)and Miss. Padmarani Noorain (19814095) as a partial fulfilment for the award of Degree of Master of Science in Mathematics represents their project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. They have carried out this project work at the P. G. Department of Mathematics, Kamatak University, Dharwad, under my supervision and guidance.

M.Sc., Pla. D. Project Guide LX-DEHARGELOF

Karnatak Linwersity, Dharwad Dharwed-580 003, India.

Department of Mathematics Kamatak University, Dharwad CHAIRMAN

Examiners:

1 1/08/202) 2.

Department of Mathematica Karnatak University. DHARMAD-580 003



Dr. P. G. Patil Kamataka, India Department of Mathematics Pavate Nagar, Dharwad-580 003 Professor

Phone: (1836-221522(O)

Date: 30107 12021

CERTIFICATE

This is to certify that the M.Sc. project work dissertation entitled "FUZZY NUMBERS" submitted to the Karnatak University, Dharwad hy Miss. PRATIBHA METI (19S14100) and Miss.PREETI KALAKOTI (19S14102) as a partial fulfilment for the award of Degree of Master of Science in Mathematics represents their project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. They have carried out this project work at the P.G. Department of Mathematics, Karnatak University, Dharwad, under my supervision and guidance.

Dr. P. G. Bann Project Guide Departmen**Of MithematicRATIL** Karnatak University, Dhatwad, Ph. D. Professor Department of Mathematics Karnatak University Examiner har wad SP 003, India.

Charman Departmethy Managematics Karnatak University, DHARWAD-500 003

Torlastan 2



CERTIFICATE

This is to certify that the M.Sc. project work dissertation entitled "LAPLACE TRANSFORM AND ITS APPLICATIONS" submitted to Department of Mathematics, Karnatak University Dharwad by MS. LALITA MADIWALASHIVAYOGI ADAMANI, MS. GURUDEVI SHIVANAND KAPANUR and MS. KUNJARANI TELI as a partial fulfillment for the award of degree of Master of Science in Mathematics and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. They have carried out this project work at the. Department of Mathematics, Karnatak University, Dharwad under my supervision and guidance.

Place: Dharwad

Dr. P. M. Pat

Department of Mathematics Karnatak University, Dharwad Department of Mathematics Karnatak University Dharwad-580 003, India.

CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003

Examiners:



CERTIFICATE

This is to certify that, the M.Sc project work dissertation entitled "PARTIAL DIFFERENTIAL EQUATION AND ITS APPLICATIONS" submitted to Karnatak University, Dharwad by Ms. GOURI JAKKAPPA JALAPUR (Reg. No. 19S14073) and Ms. KAVITA ANGADI (Reg. No. 19S14078) as a partial fulfillment for the award of the degree of Master of Science in Mathematics represents their project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. They have carried out this project work at the Department of Studies in Mathematics, Karnatak University, Dharwad, under constant support and immense guidance of Dr. P. M. Patil, Department of Mathematics, Karnatak University, Dharwad during academic

vear 2020-21. Dr. P. M. Patil

Project guide TIL Department of Mathematics, Karnatak University, Dharwad.

Karnatak University Dharwad-580 003, India. **Examiners**: (1)

Chairn

Department of Mathematics, Karnatak University, Dharwad.

CHAIRMAN Department of Mathematics Karnatak University. DHARWAD-580.000

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DEPARTMENT OF MATHEMATICS

Certificate

This is to certify that the dissertation entitled "Boundary Value Problems In Rectangular Coordinates" submitted to the Department of Mathematics, Karnatak University, Dharwad, is satisfactorily completed by Mr. Javid Aqtar I. Shaikh and Mr. Kalakamalleshwar D for the partial fulfillment of the requirement for the award of the Degree of Master of Science in Mathematics during the academic year 2020-2021.

Dr. P. M. Patil Professorsc., Ph. D. Professor Department of Mathematics

Karnatak University Dharwad-580 003, India. Dharwad

Dr. H. S. Ramane

The Chairman Department of Mathematics DepartmKatnatak University Karnatak University, DHARWAD hanvado3

Place: Dharwad Date:

Examiners:

2.

1.



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P. G. DEPARTMENT OF MATHEMATICS KARNATAKA UNIVERSITY, DHARWAD

CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled **"GREEN'S FUNCTIONS WITH APPLICATIONS"** submitted by, **Mr. GIREESH M SINDHOOR and Mr. GIREESH PUJARI** of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of **M.Sc. in Mathematics,** is a result of M.Sc., project work carried out by them under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad Date: Dr. P. M. Patil Professor M. Sc., Ph. D. **Department of Mathematics** Karnataka University, Dharwad Dharwad-580 003, India. Examiners:-1)

Dr. H.S. Ramane Chairman Department of Mathematics Karnataka University Dharwad DHARWAD-500 003

2)



Certificate

This is to certify that the M.Sc project work dissertation entitled "NUMERICAL METHODS FOR DIFFERENTIAL EQUATION" submitted to department of Mathematics, Karnataka University, Dharwad by Miss. Geeta B. Kalappanavar and Miss. Jyoti Choukashi as a partial fulfillment for the award of degree of Master of Science in Mathematics and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. She has carried out this project work at the Department of Mathematics, Karnataka University, Dharwad under my supervision and guidance.

Place : Dharwad

Date: 30 0 7 1002

Professor Dr. P.M.Patil DEn, oPMAtherates Karnataka University Sharwood Professor Department of Mathematics Karnatak University Dharwad-580 003, India.

Chairman: Dr. H.S.Ramane Dept. of Mathematics Department of Mathematic Karnataka University Dharwad Karnataka University, DHARWAD-580 003

EXAMINER



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P. G. DEPARTMENT OF MATHEMATICS

CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled "DIFFERENTIATION AND IT'S APPLICATIONS" submitted by Miss. SEEMA. R. MORAB (Reg.No.19514118), Miss. SHILPA (19S14122), Miss. Shweta. D. Bhajantri (19S14124) of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc. in Mathematics, is a result of M.Sc., project work carried out by her under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad Date: 30-7-2021

Dr (Seath Rht Sr Deavanal Dr (Seath Rht Sr Deavahal Department of Mathemssil, 94.D Karnatek University, Dharwad-03 Examiners:-

1) R.S. Dyavanal - RED 718/21 2)

Prof. H.S. Rantane Department of Mathemat Karnatak University. DHARWAD-590 003

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Dr. (smt) R. S. Dyavanal. Professor Department of Mathematics KUD

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Pavate Nagar, Dharwad-580003 Karnataka, India Phone:0836-221522(O)

Date: 02/08/2021

CERTIFICATE

This is to certify that the M. Sc. project work dissertation entitled "Numerical Methods" submitted to the Karnatak University, Dharwad by Miss.Shwetha.S.Janagi.(Reg.No.19S14125),Miss.Shankarevva.M.Hunasheekatti(Reg.No.19S14121) and Miss.Seetha Bai.G.(Reg.No.19S14119) as a partial fulfilment for the award of Degree of Master of Science in Mathematics represents their project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. He/She has carried out this project work at the P. G. Department of Mathematics, Karnatak University, Dharwad, under my supervision and guidance.

Dr. (smt) R. S. Dyavanal. Project Guide Department of Mathematics Karnatak University, Dharwad

Examiners:

2.

Chairman,

Department of Mathematics Kamataka University, Dharwad Karnatak University, DHARWAD-580 003

1. R.S. Dyavanal - Rep 7/8/2021

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Department of Mathematics



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Date: 30 07 2001

CERTIFICATE

This is to certify that the M. Sc. project work dissertation entitled "GRAPH THEORY AND ITS APPLICATIONS" submitted to the Karnatak University, Dharwad by Sangeeta Hosamani(Reg.No.19S14116), Sanjana K Janjalli(Reg.No.19S14117) and Smeeta I Kuriyavar(Reg.No.19S14126) as a partial fulfilment for the award of Degree of Master of Science in Mathematics represents their project work and it has not been submitted previously, for the award of any other degree or diploma of this or any other University or Institution. She has carried out this project work at the P. G. Department of Mathematics, Karnatak University, Dharwad, under my supervision and guidance.

Dr.(smt)R.S.Dyavanal Project Guide Bepartment of Mathematics/ Carnatak Upiversity, Dharwad Department of Mathematics Karnatak University, Dharwad-03

Examiners:

2.

Chairman Department of Mathematics Karnatak University, Dharwad Department of Mathematics

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P. G. DEPARTMENT OF MATHEMATICS KARNATAK UNIVERSITY, DHARWAD

CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled "DIFFERENTIAL IT'S EQUATIONS AND APPLICATIONS" submitted by, Mr. SANGAM MADABHAVI, Mr. SHREENATHA and Mr. SHANKARANAND of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc. in Mathematics, is a result of M.Sc., project work carried out by them under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad Date: 30-07-2021

Dr. (SProfessos Dyay Department of Mathem Karnanthe Miversity Dharward Karnatak University.

Examiners:-

Ramane Chairman Department of Mathematics Karnatak University, Dharwad CHAIRMAN

Department of Mathematics Karnatak University, CHARWAD-580 003 R.S. Dyavanal - RCD 718/2021

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P.G.DEPARTMENT OF MATHEMATICS CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled"A study of wavelets, Daubechies wavelet based numerical method for the solution of volterra integral equation of second kind and applications of wavelets in Electronics" submitted by Reg.No.19S14103 <u>Mr.Punitraj</u> of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc., in Mathematics, is a result of M.Sc., project work carried out by him under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad Date:

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Project Guide Prof. S. C. Shiralashetti Dr. S. C. SHIRALASHETTI M.Sc., PGDCA,M.Phil.,Ph.D. Professor Department of Mathematics KarEscamine,rStarwad-580003

Chairman Deproment of Mathematics Karnatak University, DHARWAD-580 003

Post. S. c. Shroalashe 200



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This is to certify that the M.Sc., project work dissertation entitled "A STUDY OF WAVELETS, COIFMAN WAVELET BASED NUMERICAL METHOD FOR THE SOLUTION OF LINEAR VOLTERRA INTEGRAL EQUATIONS AND APPLICATIONS OF WAVELETS IN WIDEBAND SCATTERING AND ENVIRONMENTAL IMAGING" submitted by Reg. No. 19S14104: <u>Miss. R. PRAVALLIKA</u> of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc., in Mathematics, is a result of M.Sc., project work carried out by her under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

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Place: Dharwad

Date: 02.08.2021

Project Guide Prof. S. C. Shiralashetti Dr. S. C. SHIRALASHETTI I.Sc. PGDCAM.Phil.Ph.D. Examinersor

pepartment of Mathematics

Carnatak University, Dharwad 580003

Chairman

Prof. H. S. Ramane CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 000



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CERTIFICATE

This is to certify that the M.Sc. project work dissertation entitled "A study of wavelets, spline wavelet based method for the study of areal rough surfaces and application of wavelets in statistical estimation" submitted by: Miss. R Shreedevi (Reg.No.19S14105) of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc. in Mathematics, is a result of M.Sc. project work carried out by her under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021

Place: Dharwad

Project Guide Prof. S. C. Shiralashetti Dr. S. C. SHIRALASHETTI H.Sc., PODCA.M.Phil.Ph.D. Professor Department of Mathematics AS Offers Dharwad-580003 1) Forf. S. C. Shroalashe

Date: 02.08.21

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Chairman Prof. H. S. Ramane

CHAIRMAN **Department of Mathematics** Karnatak University. DHARWAD-580 003



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CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled "A study of wavelets, Haar wavelet based lifting scheme for microprocessor and VLSI applications and Applications of wavelets in physics" submitted by Reg.No.19S14106: <u>Miss. Radha Timmanna Hegde</u> of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc., in Mathematics, is a result of M.Sc., project work carried out by her under my guidance. This project is submitted in partial fulfilment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad

Project Guide Prof. S. C. Shiralashetti Dr. S. C. SHIRALASHETTI M.Sc., PGDCA.M.Phil.,Ph.D. Professor IDepurtments: of Mathematics Kamatak University, Dharwad-580003 Date: 03 08 2021

Prof. H. S. Ramane CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003

2) Proof. S. c. Shroalashetti \$ 7/8/2021



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CERTIFICATE

This is to certify that M.Sc., Project dissertation entitled "A study of Wavelets, Chebyshev wavelet Based Numerical Method to Solve Integral Equations And Applications of Wavelets in Chemistry". Submitted by Reg. No-19S14107:

Mr. Raghavendra Dilleppa Kuriyavar of fourth semester M. Sc in Mathematics to the Karnatak University, Dharwad for the award of the Degree of M.Sc., in Mathematics, is a result of M. Sc., Project work carried out by him under my guidance. This Project is Submitted in partial fulfilment of the requirement for the award Of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad

Project Guide:

Prof. S. C. Shiralashetti Dr. S. C. SHIRALASHETTI M.Sc., PGBCAMEPHI, Ph.D. Examinersfessor Department of Mathematics Kamata) University, Bharwad-580003 Date:

Chairman

Dr. H S. Ramane

CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003

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P.G.DEPARTMENT OF MATHEMATICS CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled "A Study of Wavelets, Multiwavelets based numerical solution of Integral equation and applications of wavelets in chemical engineering" submitted by Reg.No.19S14108: <u>Mr.Raju Dodamani</u> of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc., in Mathematics, is a result of M.Sc., project work carried out by him under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad Date:

Project Guide

Prof. S. C. Shiralashetti

Dr. S. C. SHIRALASHETTI

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M.Sc., PGDCA.M.Phil.Ph.D.

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Prof. CHARRANAN Department of Mathematics Karnatak University, DHARWAD-580 002



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This is to certify that the M.Sc., project work dissertation entitled "A Study of Wavelets, Wilson wavelet based numerical technique for the solution of differential equations and Applications of Wavelets in power system" submitted by Reg.No.19S14109: <u>Miss. Rashmi Adrushavya Hiremath</u> of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc., in Mathematics, is a result of M.Sc., project work carried out by her under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad

Project Guide

Prof. S. C. Shiralashetti Dr. S. C. SHIRALASHETTI M.Sc., PGDCAM.Phil.,Ph.D. Professor Examine rs Methematics Kappatak University, Dharwad-580003

roof- S. c. Shroalashetti

Date: 04/08/2021

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Chairman Prof. H. S. Ramane

CHAIRMAN Department of Mathematic Karnatak University, DHARWAD-580 003



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CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled "A study of Wavelets, Lucas Wavelet Based Numerical Method to Solve differential equations and Applications of Wavelets in Civil Engineering" submitted by Reg.No.19S14110: <u>Miss. Rekha</u> Shantageri of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc., in Mathematics, is a result of M.Sc., project work carried out by her under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad Date: **Project Guide** Prof. S. C. Shiralashetti amane Depar of Mathematics Dr. S. C. SHIRALASHETTI Karnatak University, M.Sc., PGDCA.M.Phil.Ph.D. DHARWAD-580 003 Professor Department of Mathematics KEXaminers Ditarwad-580003 oof. S. C. Shraleshetting



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This is to certify that the M.Sc., project work dissertation entitled "A Study of Wavelets, Chebyshev wavelet based numerical technique for the solution of differential equations and applications of wavelets in Geosciences" submitted by Reg.No.19S14111: <u>Miss. Renuka Ramachandra Hoonkali</u> of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc., in Mathematics, is a result of M.Sc., project work carried out by her under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Proof. S. c. Shrodashetti \$718/2021

Place: Dharwad

Project Guide Prof. S. C. Shiralashetti Dr. S. C. SHIRALASHETTI M.Sc., PGDCA,M.PhH.,Ph.D. Professor ExaminerSi athematics Kappiak University, Dharwad-580003 Date: 04/08/2021

2)

Chairman Prof. H. S. Ramane

CHAIRMAN Department of Mathematik Karnatak University, DHARWAD-580 003



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CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled "A Study of Wavelets, Haar Wavelet Based Method for the Solution of Nonlinear Volterra Integral Equations of First Kind and Applications of Wavelets in Biology" submitted by Reg. No. 19S14112: <u>Miss. Reshma.</u> <u>K. Korishettar</u> of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc., in Mathematics, is a result of M.Sc., project work carried out by her under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad

Project Guide Prof. S. C. Shiralashetti Dr. S. C. SHIRALASHETTI M.Sc., PGDCA,M.Phil.,Ph.D. Professor aminerstiathematics Kamatak University, Dharwad-580003 S. C. Shrales

Date: 6-8-21

Chairman

Prof. H. S. Ramane CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003



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This is to certify that the M.Sc., project work dissertation entitled "A study of Wavelets, An application of Daubechies wavelets in signal processing and an application of Daubechies wavelets in Image processing" submitted by Reg.No.19S14113: <u>Miss. Reshma Kadakol</u> of fourth semester M.Sc. in Mathematics course to the Karnatak University, Dharwad for the award of the degree of M.Sc., in Mathematics, is a result of M.Sc., project work carried out by her under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad

Date: 02/08/2021

Project Guide Prof. S. C. Shiralashetti Dr. S. C. SHIRALASHETTI M.Sc., PGDCA,M.Phil.,Ph.D. Professor Examined Stathematics Kapatak University, Dharwad-580003

Prof. S. c. Shiralashett

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Prof. H. S. Ramane CHAIRMAN Department of Mathematics Karnatak University, DHARWAD 580 003



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P. G. DEPARTMENT OF MATHEMATICS

CERTIFICATE

This is to certify that the M.Sc., project work dissertation entitled "A STUDY OF CHEBYSHEV WAVELETS. WAVELET BASED NUMERICAL METHOD FOR THE SOLUTION OF INTEGRO-DIFFERENTIAL EQUATION AND APPLICATIONS OF WAVELETS IN MECHANICAL ENGINEERING" submitted by Reg.No.19S14114, Mr. SACHIN C SAUNSHI of fourth semester M.Sc. in Mathematics course to the Karnataka University, Dharwad for the award of the degree of M.Sc. in Mathematics, is a result of M.Sc., project work carried out by him under my guidance. This project is submitted in partial fulfillment of the requirement for the award of Master's Degree in Mathematics during the academic year 2020-2021.

Place: Dharwad Date: 30/07/2021

Project Guide Prof. S. C. Shiralashetti Dr. S. C. SHIRALASHETTI Examinets: PODCAM Phil. Ph.D. Professor Department of Mathematics Minatak University, Dharwad:580003 Prof. S. C. SI

Prof. H.S.Ramane CHAIRMAN Department of Mathematics Karnatak University, DHARWAD-580 003

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